Go Directly to Jail: The Case for Sherman Act Liability

By “Coach Vance” Trefethen

***Resolved: The United States federal government substantially reform the use of Artificial Intelligence technology***

Case Summary: You may have heard of Gen. William T. Sherman, whose Union army burned down Atlanta during the Civil War. Gen. Sherman’s brother John Sherman had an illustrious political career, including service as a US Senator from Ohio. In 1890, Sen. Sherman started the process that led to legislation to correct one of the social injustices perceived at the time to be a growing problem in the US economy: Collusion replacing competition among suppliers in the marketplace. That legislation, which is still on the books and actively enforced by the Justice Department today, became known as the “Sherman Antitrust Act,” or simply the “Sherman Act.” It makes it a federal crime for suppliers to communicate with one another in any way that involves agreements to set prices for products they are selling. For example, imagine all the gas station owners in your town have a secret conference and agree on a “price fixing scheme” in which they will all charge $4/gallon for gasoline. Such an agreement to stop competing with each other might be enforced by agreeing further that if any station deviates from the fixed price, all the others will immediately drop theirs to 10c/gallon lower than the deviator’s price to punish the deviator, and raise it back to $4 whenever the deviator gets back on board. Such a collusive conspiracy would be illegal and punishable under the Sherman Act, and you can see why. Consumers in that town are having their pockets picked by the absence of competition in the gasoline market, and they are paying prices substantially higher than a competitive market would have allowed.

The Sherman Act, however, does not prohibit sellers from adjusting their prices in response to other sellers as long as they are not communicating nor colluding with the other sellers. For example, if one seller raises his prices, another seller might raise his to match, instead of keeping prices low to compete. As long as there was no agreement to do so, it’s perfectly legal.

Enter now the world of AI. More and more sellers are making use of AI to set prices dynamically. Times of day, seasons of year, local and global events, all can be taken into account. One AI program looked at another seller and noticed they had lowered their prices… and decided to raise its own prices. The manager thought the AI had gone bonkers until the manager realized that the lower price store had a line out the door and people were getting angry and walking away… to his store, which now had higher prices and was making more money than ever.

The problem arises when two or more sellers who control a substantial amount of a market both use AI to set prices. Experiments have shown that when this occurs, the “competing” AI’s will “learn” to adjust their prices in a way that exactly matches what would happen if the human sellers were on the phone collaborating with each other to set higher prices. And it happens without any communication at all, so it wouldn’t violate the Sherman Act. This plan closes this loophole and adds the protections of the Sherman Act to artificial intelligence pricing that artificially inflates prices even when no literal (communicated) collusion takes place.

Terminology:

“Monopoly” – a market where a single seller dominates, controlling the sales of most or all of a particular product. It’s considered a bad thing because the seller can raise prices higher than would be possible in a freely competitive market.

“Trust” – old-fashioned term for a combination of businesses that combine, collude, or coordinate as they attempt to gain monopoly power. “Antitrust” is the inverse; it’s the attempt by government to stop businesses from doing that.

“Oligopoly” – a market where there are only a few (but more than one) sellers, and they may be tempted to collude with each other to reduce competition and act like a monopoly.

“Cartel” – a group of suppliers who actively collude to avoid competing with each other so that they can set higher than market prices.

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Go Directly to Jail: The Case for Sherman Act Liability

If the executives of the major corporations in a sector of the economy had a conference call and agreed to stop competing on the prices they charge for their products, they’d be committing a federal crime and could go to jail for violating the Sherman Act. But what happens when they use artificial intelligence applications that independently arrive at the same results? Competition is destroyed, but no one goes to jail, because you can’t prosecute a computer. Something’s wrong with this picture, and that’s why we’re affirming that: The United States Federal Government should substantially reform the use of artificial intelligence technology.

OBSERVATION 1. DEFINITIONS

Substantial

Merriam Webster Online Dictionary copyright 2021. <https://www.merriam-webster.com/dictionary/substantially> (accessed 28 May 2021)

**:**considerable in quantity **:**significantly great

Reform

Merriam Webster Online Dictionary copyright 2021 <https://www.merriam-webster.com/dictionary/reform> (accessed 28 May 2021)

**:**to put or change into an improved form or condition

Artificial Intelligence

Merriam Webster Online Dictionary copyright 2021. <https://www.merriam-webster.com/dictionary/artificial%20intelligence> (accessed 28 May 2021)

**:**the capability of a machine to imitate intelligent human behavior

The Sherman Antitrust Act of 1890

US Dept of Justice 2021. (originally published in Sept 2005, revised in Feb 2021) “PRICE FIXING, BID RIGGING, AND MARKET ALLOCATION SCHEMES: WHAT THEY ARE AND WHAT TO LOOK FOR” <https://www.justice.gov/atr/file/810261/download> (accessed 18 Aug 2021)

The Sherman Act prohibits any agreement among competitors to fix prices, rig bids, or engage in other anticompetitive activity. Criminal prosecution of Sherman Act violations is the responsibility of the Antitrust Division of the United States Department of Justice. Violation of the Sherman Act is a felony punishable by, for corporations, a fine of up to $100 million, and for individuals, a fine of up to $1 million or 10 years’ imprisonment (or both).

OBSERVATION 2. INHERENCY, the structure of the Status Quo.

FACT 1. Avoiding responsibility

Corporations can avoid responsibility for misconduct by letting artificial intelligence do the dirty work

Prof. Mihailis E. Diamantis 2020 (Assoc. Professor, Univ of Iowa College of Law) The Extended Corporate Mind: When Corporations Use AI to Break the Law, NORTH CAROLINA LAW REVIEW 1 May 2020 , The Extended Corporate Mind: When Corporations Use AI to Break the Law https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=6786&context=nclr (accessed 16 Aug 2021)

Algorithms may soon replace employees as the leading cause of corporate misconduct. For centuries, the law has defined corporate misconduct—anything from civil discrimination to criminal insider trading—in terms of employee misconduct. Today, however, breakthroughs in artificial intelligence and big data allow automated systems to make many corporate decisions, e.g., who gets a loan or what stocks to buy. These technologies introduce valuable efficiencies, but they do not remove (or even always reduce) the incidence of corporate harm. Unless the law adapts, corporations will become increasingly immune to civil and criminal liability as they transfer responsibility from employees to algorithms.

FACT 2. No legal remedy

Several types of corporate misconduct, including price-fixing, can be done by artificial intelligence without any legal remedy under current law

Prof. Mihailis E. Diamantis 2020 (Assoc. Professor, Univ of Iowa College of Law) , The Extended Corporate Mind: When Corporations Use AI to Break the Law, NORTH CAROLINA LAW REVIEW 1 May 2020 , The Extended Corporate Mind: When Corporations Use AI to Break the Law (accessed 16 Aug 2021) (“super competitive” in this context means prices that are above the prices that a competitive market would have provided had there been fair competition and no collusion among suppliers; it’s a bad thing.) https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=6786&context=nclr

Real-life examples of corporate algorithmic harm that merit a searching liability inquiry include:   
• A lender’s automated platform approving mortgages in a fashion that has a discriminatory racial impact but might also have a business justification.  
 • Competing retailers’ pricing algorithms setting prices at matching, super-competitive levels**.[END QUOTE**]  
 • A delivery company’s self-driving truck striking a jaywalking pedestrian.  
 Not long ago, corporations relied on human employees to carry out each of these functions. Today, many corporations use algorithms to approve loans, set prices, and transport goods. The move toward automation does not alter the fact that discrimination, price fixing, and reckless driving leave victims in their wake. These victims, or the state on their behalf, should have as clear a path to justice as their counterparts a decade ago. In cases of algorithmic misconduct, it is particularly important that the path hold open the possibility of corporate liability. As corporations replace employees with algorithms, corporate liability becomes the only means of redress. [**HE GOES ON IN THE SAME CONTEXT TO CONCLUDE QUOTE**:] Employees are accountable for their own misconduct, whether on or off the job. Algorithms, however, are not subject to suit. The problem is that the law is not equipped to address corporate liability when the “thinking” behind corporate misconduct has been offloaded to automated systems.

FACT 3. Artificial intelligence enables price collusion

AI pricing programs set and adjust them in a collusive strategy that artificially raises them and punishes firms that deviate from the higher price

Stephanie Assad, Prof. Robert Clark, Prof. Daniel Ershov and Dr. Lei Xu 2020 (Assad – teaching assistant, Queens Univ., Canada. Clark – prof. of economic policy, Queens Univ., Canada. Ershov - Assistant Professor at the Toulouse School of Economics. Xu – PhD; Senior Economist at Bank of Canada.) Aug 2020 “Algorithmic Pricing and Competition: Empirical Evidence from the German Retail Gasoline Market” <https://www.cesifo.org/en/publikationen/2020/working-paper/algorithmic-pricing-and-competition-empirical-evidence-german> (accessed 17 Aug 2021)

Pricing-algorithm technology has become increasingly sophisticated in recent years. Although firms have made use of pricing software for decades, technological advancements have created a shift from mechanically-set prices to AI-powered algorithms that can handle vast quantities of data and interact, learn, and make decisions with unprecedented speed and sophistication. The evolution of algorithmic-pricing software has raised concerns regarding the potential impact on firm behaviour and competition. [**END QUOTE**] In particular, the potential for the use of algorithms as a means to facilitate collusion, either tacit or explicit, has been a popular discussion-point among antitrust authorities, economic organizations, and competition-law experts in recent years (OECD 2017; Competition Bureau 2018; Autorit´e de la Concurrence and Bundeskartellamt 2019; UK Digital Competition Expert Panel 2019; Ezrachi and Stucke 2015, 2016, 2017; Varian 2018; Goldfarb et al 2019). Since the goal of reinforcement learning-based algorithms is to converge to an optimal policy, the concern arises that AI agents will learn to play a collusive strategy to achieve a joint-profit maximizing outcome. [**THEY CONTINUE LATER IN THE CONTEXT SAYING QUOTE:]** Whether these strategies are learned or programmed-in explicitly by users, the employment of algorithmic software can facilitate collusion through increased ease of monitoring and speed of detection and punishment of possible deviations.

OBSERVATION 3. The HARM. It’s simple: Consumers are harmed. We see this in 3 sub-points:

A. Significance. One of the biggest things we need to deal with for enforcement of fair markets is preventing AI price fixing

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 17 Aug 2021) (brackets and ellipses in original, where Harrington is quoting Margarethe Vestager)

If autonomous cars can navigate city roads and traffic, is it that difficult to imagine autonomous artificial agents figuring out how to collude? Can we really be so sure that collusion by autonomous artificial agents will never be commonplace?  
 [W]hen we look at the challenges for cartel enforcement in the future, one of the biggest things we need to deal with is the risk that automated systems could lead to more effective cartels. ... So far, those cases have dealt with agreements that were put together by humans. The computers only took over when it was time to put them into practice. It’s true that the idea of automated systems getting together and reaching a meeting of minds is still science fiction. ... But we do need to keep a close eye on how algorithms are developing ... so that when science fiction becomes reality, we’re ready to deal with it. - Margarethe Vestager, European Commissioner for Competition

B. Impact: Consumers harmed. AI-induced manipulation raises prices for consumers

WALL STREET JOURNAL 2017 (journalist Sam Schechner) 8 May 2017 “Why Do Gas Station Prices Constantly Change? Blame the Algorithm” <https://www.wsj.com/articles/why-do-gas-station-prices-constantly-change-blame-the-algorithm-1494262674> (accessed 18 Aug 2021)

The rise of A.I. pricing poses a challenge to antitrust law. Authorities in the EU and U.S. haven’t opened probes or accused retailers of impropriety for using A.I. to set prices. [**END QUOTE**] Antitrust experts say it could be difficult to prove illegal intent as is often required in collusion cases; so far, algorithmic-pricing prosecutions have involved allegations of humans explicitly designing machines to manipulate markets. Officials say they are looking at whether they need new rules. The Organization for Economic Cooperation and Development said it plans to discuss in June at a round table how such software could make collusion easier “without any formal agreement or human interaction.” [**THEY GO ON LATER IN THE CONTEXT QUOTE:]** “If professional poker players are having difficulty playing against an algorithm, imagine the difficulty a consumer might have,” said Maurice Stucke, a former antitrust attorney for the U.S. Justice Department and now a law professor at the University of Tennessee, who has written about the competition issues posed by A.I. “In all likelihood, consumers are going to end up paying a higher price.” In one example of what can happen when prices are widely known, Germany required all gas stations to provide live fuel prices that it shared with consumer price-comparison apps. [The effort appears to have boosted prices](http://www.dice.hhu.de/fileadmin/redaktion/Fakultaeten/Wirtschaftswissenschaftliche_Fakultaet/DICE/Discussion_Paper/220_Dewenter_Heimeshoff_Lueth.pdf) between 1.2 to 3.3 euro cents per liter, or about 5 to 13 U.S. cents per gallon, according to a discussion paper published in 2016 by the Düsseldorf Institute for Competition Economics.

C. Growing problem. “Tacit collusion” – where AI’s raise prices without communicating– is an open loophole in the Sherman Act and is a real problem

Quinn Emanuel trial lawyers, copyright 2021. (law firm operating in Britain and the U.S.; article was written by attorneys: **Adam Wolfson**, **Kevin Teruya**, **Debra Bernstein**, **Steig Olson**, **Stephen Mavroghenis**, **Boris Bronfentrinker**) Artificial Intelligence and Antitrust: When Do Algorithms Violate Competition Laws? <https://www.quinnemanuel.com/the-firm/publications/artificial-intelligence-and-antitrust-when-do-algorithms-violate-competition-laws/> (accessed 20 Aug 2021)

The difficult question that arises in light of this law [the Sherman Act] is whether companies can be liable when their AI independently concludes that colluding with competitors will maximize revenues or profits. Such “algorithmic tacit collusion” has not yet been tested in court, but it is a real problem for competition, because AIs have already realized that colluding even tacitly with competitors can be very profitable.

OBSERVATION 4. We offer the following PLAN implemented by Congress and the President

1. Congress amends the Sherman Act to include corporate antitrust liability for the behavior of artificial intelligence applications, including tacit collusion where no communication takes place between firms.

2. Funding through existing budgets of existing agencies.  
3. Enforcement through the Federal Trade Commission and the Justice Department’s antitrust enforcement division with existing penalties under the Sherman Act.  
4. Timeline: Plan takes effect 30 days after an affirmative ballot.   
5. All Affirmative speeches may clarify

OBSERVATION 5. SOLVENCY. Corporate liability for AI is the right solution. We see this in 2 sub-points

A. AI should be prohibited when it produces the same pricing results as with illegal human collusion

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 17 Aug 2021)

The judicial doctrine that has just been described is based on collusion as it is conducted by human agents. It is predicated on the difficulty of knowing the strategy used by a human agent and, in particular, whether observed prices are supported by a reward-punishment scheme among firms. However, the situation is fundamentally different when prices are set by AAs. When prices are controlled by an autonomous artificial agent, the firm’s strategy is, in principle, observable. The rule determining price is written down in the algorithm’s code which means that it can be accessed (in some manner) and, in that sense, it is possible to get "inside the head" of the pricesetting agent. We are not left with trying to indirectly infer the latent strategy from observed behavior amidst a changing environment, but rather can directly observe the strategy itself. And if one can observe the strategy then one can determine whether it embodies a reward-punishment scheme, which is the defining feature of collusion, what results in supracompetitive prices, and what should be prohibited.  
**END QUOTE. HARRINGTON GOES ON TO EXPLAIN LATER IN THE CONTEXT QUOTE:**Evidentiary Methods: Liability would be determined by: 1) an examination of the pricing algorithm’s code to determine whether it is a prohibited pricing algorithm; or 2) entering data into the pricing algorithm and monitoring the output in terms of prices to determine whether the algorithm exhibits a prohibited property.

B. Corporate liability incentivizes businesses to make sure AI doesn’t misbehave

Prof. Mihailis E. Diamantis 2020 (Assoc. Professor, Univ of Iowa College of Law) The Extended Corporate Mind: When Corporations Use AI to Break the Law, NORTH CAROLINA LAW REVIEW 1 May 2020 , The Extended Corporate Mind: When Corporations Use AI to Break the Law https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=6786&context=nclr (accessed 16 Aug 2021)

According to deterrence theory, criminal liability should seek to prevent corporate misconduct by raising the costs of violating the law. The law can do this by using the threat of sanctions to induce corporations to run their businesses more carefully. Ordinarily, this means corporations will implement additional compliance programs for things like employee training and monitoring. Where algorithms are concerned, taking care means designing algorithms that are less likely to break the law. While nothing can guarantee that a machine learning algorithm will always follow the law (nor can anything guarantee employees will always follow the law either), software engineers can take steps to reduce the probability that algorithms will misbehave. **[END QUOTE**] These steps include: diversifying the body of engineers writing algorithms, more careful initial programming, more mindful selection of training data sets, more extensive pre-roll-out testing, regular post-roll-out quality audits, routine run-time compliance layers, effective monitoring, and continuous software updates to address problems as they arise. Programmers also have tools they can use to prove (to themselves or to others) that an algorithm has been applying its rules consistently. Each of these precautions entail costs that, all things considered, corporations would rather avoid. **[HE CONCLUDES LATER IN THE CONTEXT QUOTE:]** Through the threat of sanction, criminal liability can make taking precaution cheaper than risking violation.

2A Evidence: Sherman Act

BACKGROUND

Definition and mechanism for how price collusion works among firms that are supposed to be competing

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 16 Aug 2021) (supracompetitive = prices unfairly higher than what a competitive market would have provided had the suppliers been competing with each other)

Definition Collusion is when firms use strategies that embody a reward-punishment scheme which rewards a firm for abiding by the supracompetitive outcome and punishes it for departing from it. From hereon, a "collusive strategy" refers to a reward-punishment scheme that, when adopted by all firms, results in supracompetitive prices. It is appropriate to think of collusion as a self-enforcing contract. As with any contract, collusive strategies specify what it means to comply with the contract which, in this case, is to set supracompetitive prices. It also specifies a penalty should a firm fail to comply with the terms of the contract. That penalty could take the form of rival firms’ charging lower prices or some other punishment. Where this contract differs from the usual variety is that there is no third party to enforce it. It must then be self-enforcing in the sense that it is in the narrowly defined self interest of each firm to abide by the contract at all times. Hence, the penalty must be severe so that it is in the best interests of a firm to charge a supracompetitive price, rather than deviate from the terms of the contract (by undercutting rival firms’ prices) and incur the penalty. And the penalty must be credible so that a firm can anticipate it will be imposed should it deviate from the collusive outcome. It is credible when it is in each firm’s interests to go through with the punishment in response to a firm having deviated from setting the collusive price. The penalty is then not implemented by a third party, such as the courts with the assistance of law enforcement, but rather is imposed by the firms themselves. In sum, a collusive strategy contains a reward-punishment scheme designed to provide the incentives for firms to consistently price above the competitive level. Furthermore, it is in a firm’s best interests to adopt a collusive strategy only when it believes other firms have similarly adopted it. Hence, there must be some mutual understanding among firms that they are using this collusive strategy. Collusion is the common adoption of a strategy embodying a rewardpunishment scheme, and supracompetitive prices are the product of that adoption.

Agreement among companies to collude on setting prices is a violation of Section 1 of the Sherman Act

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 16 Aug 2021)

Competition law as it pertains to collusion is often dated from the Sherman Act in the United States in 1890 (though Canada preempted the United States by instituting its competition law in 1889). Section 1 prohibits contracts, combinations, and conspiracies that unreasonably restrain trade. Subsequent judicial rulings have effectively replaced the reference to "contracts, combinations, and conspiracies" with the concept of "agreement." It is now understood that firms are in violation of Section 1 when there is an agreement among competitors to limit competition.

Scenario for how AI pricing by firms in a market can bring the end result of price collusion even without communication between the firms

Neveena Radlova 2020 (attorney in commercial practice in Europe; expertise in merger control and merger clearance, anti-trust and compliance matters, unfair competition) “LIABILITY FOR MACHINE TO MACHINE CARTELS”14 Apr 2020 <https://cms.law/en/cze/publication/liability-for-machine-to-machine-cartels> (accessed 17 Aug 2021) (“ith differentiated” should be “with differentiated” – it’s a typo in the original article)

In this scenario competing firms unilaterally design an algorithm to achieve a predetermined goal – usually  profit maximisation – and the machines collude autonomously. Self-learning algorithms work through the mechanism of trial and error, and they can experiment with different pricing strategies and adjust their prices in real time to the ones of rivals. This could easily lead to increased market transparency and tacit collusion (conscious  parallelism).  Undoubtedly, it would be difficult for algorithms to sustain collusion in markets that are highly competitive, ith differentiated products, or with low barriers to entry. However, in markets that are already susceptible to collusion, it would be relatively easy for algorithms to allow competitors to move towards a coordinated equilibrium.

INHERENCY

Isn’t is illegal in the Status Quo? No - the Sherman Act prohibits “communication” and “agreement” about prices, and the AI’s aren’t communicating with each other

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 20 Aug 2021)

Supracompetitive prices are the result of collusion, where collusion is the use of (collusive) strategies that embody a reward-punishment. Collusion is facilitated by communication, where communication involves firms’ representatives actively seeking to achieve a mutual understanding to adopt collusive strategies. Thus, communication causes collusion and collusion causes supracompetitive prices. The law objects to neither supracompetitive prices nor collusion but rather to communication; that is, it makes the process by which collusion is achieved illegal. Consequently, collusion without communication is lawful, such as conscious parallelism. Hence, collusion by autonomous artificial agents is lawful because the communication to which courts object is absent, and there is no liability because autonomous artificial agents lack the capacity to mutually understand and thus cannot have an agreement.

Legal doctrine of *respondeat superior* (corporate responsibility for on the job misconduct of its employees) doesn’t apply to algorithms, making them immune to liability

Prof. Mihailis E. Diamantis 2020 (Assoc. Professor, Univ of Iowa College of Law) , The Extended Corporate Mind: When Corporations Use AI to Break the Law, NORTH CAROLINA LAW REVIEW 1 May 2020 , The Extended Corporate Mind: When Corporations Use AI to Break the Law (accessed 16 Aug 2021)

When corporations misbehave through their employees, respondeat superior produces relatively straightforward liability determinations. But when corporations misbehave through their algorithms in ways that, from the outside, look just as purposeful, knowing, or reckless as the misbehavior carried out by human employees, current liability doctrines do not apply. In a commercial world increasingly run on silicon, it is surprising that the law’s understanding of the corporate mind is still tied to a prehistoric lump of grey organic matter.  
**[END QUOTE. LATER IN THE SAME CONTEXT HE CONCLUDES QUOTE:]**

The current state of the law is troubling because it all but guarantees that corporations will become increasingly immune to liability as their operations require less and less human intervention.

Status Quo law of collusion requires evidence of overt communication between firms that were supposed to be competing

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 16 Aug 2021)

In understanding what makes for an illegal process, courts have been guided by the requirement that "there must be evidence that tends to exclude the possibility that the [firms] were acting independently.” While many avenues have been pursued by plaintiffs to argue that firms’ conduct could not have been reached independently, successful recipes for convincing a court of that claim have almost always had a common ingredient: evidence of an overt act of communication. When firms communicate in a manner pertinent to future conduct (either expressing intentions or conveying information relevant to intentions), they create the legitimate concern that they have influenced each other’s conduct and, therefore, their behavior was not reached independently but was instead the product of an agreement.

HARMS / SIGNIFICANCE

German Study: Adoption of AI pricing raised prices among gas stations by reducing competition with the same effects as if they had actively colluded

Stephanie Assad, Prof. Robert Clark, Prof. Daniel Ershov and Dr. Lei Xu 2020 (Assad – teaching assistant, Queens Univ., Canada. Clark – prof. of economic policy, Queens Univ., Canada. Ershov - Assistant Professor at the Toulouse School of Economics. Xu – PhD; Senior Economist at Bank of Canada.) Aug 2020 “Algorithmic Pricing and Competition: Empirical Evidence from the German Retail Gasoline Market” <https://www.cesifo.org/en/publikationen/2020/working-paper/algorithmic-pricing-and-competition-empirical-evidence-german> (accessed 17 Aug 2021)

Adopting monopolist stations with no competitors in their ZIP code see no statistically significant change in their margins. Adopting stations with competitors in their ZIP code see a statistically significant mean margin increase of 0.8 cents per litre and the distribution of their margins shifts right. These results suggest that algorithmic pricing software adoption raises margins only through its effects on competition. To further investigate whether algorithmic pricing affects competition and to test predictions from the theoretical literature, we look at market-level adoption in duopoly (two station) markets. IV estimates suggest that relative to markets where no stations adopt, markets where both stations adopt see a mean margin increase of 2.2 cents per litre, or roughly 28%. Markets where only one of the two stations adopts see no change in mean margins. These results show that market-wide algorithmic-pricing adoption raises margins, suggesting that algorithms reduce competition. The magnitudes of margin increases are consistent with previous estimates of the effects of coordination in the retail gasoline market (Clark and Houde 2013, 2014; Byrne and De Roos 2019).

Real life example: Gasoline prices in Germany were artificially inflated

Gareth Shier and Dr. Timo Klein 2020 (Shier - MSc Economics, University College London. Klein – PhD economics; Lecturer in Competition Economics at Utrecht University School of Economics and School of Law) 26 Nov 2020 “The risks of using algorithms in business: artificial price collusion” https://www.oxera.com/insights/agenda/articles/the-risks-of-using-algorithms-in-business-artificial-price-collusion/

On the German retail petrol market, a recent academic working paper shows that the rise of pricing algorithms has led to reduced competition and increased margins—up to 28% for areas where two competing petrol stations both adopted algorithmic pricing. The study highlights that it is a strictly economic assessment and does not pass any legal judgment on whether there is anticompetitive behaviour—but results like these will attract the attention of authorities and regulators.

It is happening. Example: Gasoline prices in Rotterdam, Netherlands

WALL STREET JOURNAL 2017 (journalist Sam Schechner) 8 May 2017 “Why Do Gas Station Prices Constantly Change? Blame the Algorithm” <https://www.wsj.com/articles/why-do-gas-station-prices-constantly-change-blame-the-algorithm-1494262674> (accessed 18 Aug 2021) (in context, “this Dutch city” is referring to Rotterdam)

One recent afternoon at a Shell-branded station on the outskirts of this Dutch city, the price of a gallon of unleaded gas started ticking higher, rising more than 3½ cents by closing time. A little later, a competing station 3 miles down the road raised its price about the same amount. The two stations are among thousands of companies that use artificial-intelligence software to set prices. In doing so, they are testing a fundamental precept of the market economy. In economics textbooks, open competition between companies selling a similar product, like gasoline, tends to push prices lower. These kinds of algorithms determine the optimal price sometimes dozens of times a day. As they get better at predicting what competitors are charging and what consumers are willing to pay, there are signs they sometimes end up boosting prices together.

British study found widespread use of algorithms to set prices

Quinn Emanuel trial lawyers, copyright 2021. (law firm operating in Britain and the U.S.; article was written by attorneys: **Adam Wolfson**, **Kevin Teruya**, **Debra Bernstein**, **Steig Olson**, **Stephen Mavroghenis**, **Boris Bronfentrinker**) Artificial Intelligence and Antitrust: When Do Algorithms Violate Competition Laws? <https://www.quinnemanuel.com/the-firm/publications/artificial-intelligence-and-antitrust-when-do-algorithms-violate-competition-laws/> (accessed 20 Aug 2021)

The difficult question that arises in light of this law [the Sherman Act] is whether companies can be liable when their AI independently concludes that colluding with competitors will maximize revenues or profits. Such “algorithmic tacit collusion” has not yet been tested in court, but it is a real problem for competition, because AIs have already realized that colluding even tacitly with competitors can be very profitable. For example, the United Kingdom’s competition regulatory agency, Competition & Markets Authority (“CMA”), published a study in October 2018 regarding pricing algorithms and how they affect competition. The study found “evidence of widespread use of algorithms to set prices particularly on online platforms,” and that, based on “simple pricing rules provided by the platforms themselves, some third-party firms sell more sophisticated pricing algorithms to retailers or directly take on the role of pricing using computer models on behalf of their clients.”The problems for competition arose because the CMA’s simulation models confirmed that “some pricing algorithms can lead to collusive outcomes even where firms are each setting prices unilaterally.” Moreover, the study found there were serious concerns about “hub-and-spoke” arrangements (i.e., competitors coordinate with each other by each working with or through a central “hub” for the conspiracy), because firms could simply “adopt the same algorithmic pricing model” from vendors or even each other.

AI price collusion isn’t fiction, it’s now reality. EU study found retailers are using AI systems to set prices

Neveena Radlova 2020 (attorney in commercial practice in Europe; expertise in merger control and merger clearance, anti-trust and compliance matters, unfair competition) “LIABILITY FOR MACHINE TO MACHINE CARTELS”14 Apr 2020 <https://cms.law/en/cze/publication/liability-for-machine-to-machine-cartels> (accessed 17 Aug 2021)

The idea of algorithms colluding secretly, without the knowledge or the help of their developers or the businesses that employ them, used to sound like a science fiction. This possibility has now become real and has turned into a concern for competition authorities. A recent sector inquiry of the European Commission into e-commerce found that two thirds of retailers who monitor competitor’s prices use automatic systems, and some of them also use that same software to adjust prices automatically.

The fact that it can happen justifies getting legal rules in place now

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 16 Aug 2021) (brackets added)

Can AAs collude? Yes. The pricing algorithms of an AA [autonomous artificial agent] are rich enough to encompass the collusive strategies that have been used by human agents. Can AAs learn to collude in a simple setting? Yes. With two AAs, two prices, and a fixed environment, simulations show that collusion is more common than competition. Can AAs learn to collude in an actual market setting? We do not know, and I am skeptical of anyone who thinks they know. As we cannot dismiss the possibility that AAs are able to learn to collude in actual markets, it is prudent to find an appropriate legal response should they be able to do so.

For example, in a market with 2 competitors, if each of them deploys an AI system to set their prices, the 2 systems will adjust over time to achieve artificially higher prices

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 16 Aug 2021)

With the two competitors having their learning algorithms in place, each algorithm experiments with different prices and adjusts the pricing rule in response to how well it performs. Of course, performance depends on the prices set by the other firm’s learning algorithm, as those prices determine demand and therefore profits. Initially, each manager notices that profits do not seem higher and, in fact, appear to be a bit lower. However, eventually, prices start to rise and with that rise in prices comes rising profits. After some time, prices settle down and, to the great satisfaction of the managers, profits are higher than before they adopted the learning algorithms. Each manager views the experiment of using a learning algorithm to be a success, and independently decides to continue to delegate the setting of prices to the learning algorithm. On the presumption that, prior to the adoption of these learning algorithms, prices were at competitive levels then the new prices are necessarily supracompetitive. The learning algorithms have managed to adjust their pricing rules until they are using the sort of pricing rule that firms deploy when colluding.

Impact: Consumers harmed

US Dept of Justice 2021. (originally published in Sept 2005, revised in Feb 2021) “PRICE FIXING, BID RIGGING, AND MARKET ALLOCATION SCHEMES: WHAT THEY ARE AND WHAT TO LOOK FOR” <https://www.justice.gov/atr/file/810261/download> (accessed 18 Aug 2021)

American consumers have the right to expect the benefits of free and open competition — the best goods and services at the lowest prices. Public and private organizations often rely on a competitive bidding process to achieve that end. The competitive process only works, however, when competitors set prices honestly and independently. When competitors collude, prices are inflated and the customer is cheated.

SOLVENCY / ADVOCACY / ADVANTAGES

Status Quo can’t do it but: AI price collusion (even without communication among the parties) can and should be made illegal

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 16 Aug 2021)

Supracompetitive prices are the result of collusion, where collusion is the use of (collusive) strategies that embody a reward-punishment. Collusion is facilitated by communication, where communication involves firms’ representatives actively seeking to achieve a mutual understanding to adopt collusive strategies. Thus, communication causes collusion and collusion causes supracompetitive prices. The law objects to neither supracompetitive prices nor collusion but rather to communication; that is, it makes the process by which collusion is achieved illegal. Consequently, collusion without communication is lawful, such as conscious parallelism. Hence, collusion by autonomous artificial agents is lawful because the communication to which courts object is absent, and there is no liability because autonomous artificial agents lack the capacity to mutually understand and thus cannot have an agreement. The reason that courts have focused on making communication illegal is because it is difficult to determine the latent strategies underlying observed prices. Courts cannot read the minds of those who are choosing prices, and use communication in its place. In contrast, we can, in principle, "read the mind" of an autonomous artificial agent by reading its code or "simulating its mind" by entering input and observing output. It then becomes possible to determine if the prices observed are only sustained because of a reward-punishment scheme. When conducted by autonomous artificial agents, collusion can be made illegal, rather than the communication that facilities it.

Portugal Study: Portuguese Competition Authority found companies are using AI to collude on pricing and threatened legal action

Neveena Radlova 2020 (attorney in commercial practice in Europe; expertise in merger control and merger clearance, anti-trust and compliance matters, unfair competition) “LIABILITY FOR MACHINE TO MACHINE CARTELS”14 Apr 2020 <https://cms.law/en/cze/publication/liability-for-machine-to-machine-cartels> (accessed 17 Aug 2021)

In July 2019, the Portuguese Autoridade da Concorrência (AdC) published its own study into the competitive impact of algorithms. The study found that 37% of the sample of companies active online used software to monitor the prices of their competitors and 79% of those adjusted their prices in response to the output of the algorithm. The AdC warned that ‘companies are responsible for the algorithms they use and employing them with the aim of coordinating prices, or otherwise weaken competition in the market, is incompatiblewith Portuguese competition law’.

The French government, an EU Commissioner and US Deputy Assistant Attorney General advocate it

Gareth Shier and Dr. Timo Klein 2020 (Shier - MSc Economics, University College London. Klein – PhD economics; Lecturer in Competition Economics at Utrecht University School of Economics and School of Law) 26 Nov 2020 “The risks of using algorithms in business: artificial price collusion” <https://www.oxera.com/insights/agenda/articles/the-risks-of-using-algorithms-in-business-artificial-price-collusion/> (accessed 17 Aug 2021) (brackets and ellipses in original)

So what can businesses expect from authorities? First, machine learning tools can similarly be used to detect cases of collusion.  For instance, the French Competition Authority recently created a digital economy unit to develop these competencies (in the same way as several other authorities). Second, the use of pricing algorithms by firms will be increasingly scrutinised or even audited. As John Moore, Etienne Pfister, and Henri Piffaut (the last two of whom are the Chief Economist and Vice-President at the French Competition Authority respectively) recently proposed:   
[…] firms could be required […] first to test their algorithms prior to deployment in real market conditions (‘risk assessment’), then to monitor the consequences of deployment (‘harm identification’). Moreover, the US Deputy Assistant Attorney General for Criminal Enforcement, Richard Powers, recently stated:|  
Just as there’s a role for corporate compliance programs in deterring price fixing that occurs in traditional smoke-filled rooms, there’s a role for corporate compliance programs in preventing collusion effectuated by algorithms.  
This echoes earlier statements by EU Competition Commissioner Margrethe Vestager, who remarked on the ‘need to make it very clear that companies can’t escape responsibility for collusion by hiding behind a computer program’.

The German gasoline market scenario justifies regulatory action on AI pricing software

Stephanie Assad, Prof. Robert Clark, Prof. Daniel Ershov and Dr. Lei Xu 2020 (Assad – teaching assistant, Queens Univ., Canada. Clark – prof. of economic policy, Queens Univ., Canada. Ershov - Assistant Professor at the Toulouse School of Economics. Xu – PhD; Senior Economist at Bank of Canada.) Aug 2020 “Algorithmic Pricing and Competition: Empirical Evidence from the German Retail Gasoline Market” <https://www.cesifo.org/en/publikationen/2020/working-paper/algorithmic-pricing-and-competition-empirical-evidence-german> (accessed 17 Aug 2021)

We investigate the mechanism behind the increases in margins by looking at the timing of effects. If algorithms fail to learn to compete effectively we should see immediate increases in margins after both stations in duopoly markets adopt AI. If algorithms learn how not to compete, we should see no initial effects followed by eventual convergence to high prices and margins. This is what we find in the data - margins in markets where both duopolists adopt do not change for about a year after adoption and then increase gradually. This is suggestive of algorithms learning tacitly- collusive strategies over time. Overall, the results indicate that the adoption of algorithmic pricing has affected competition and facilitated tacit-collusion in the German retail gas market. Our findings suggest that regulators should be concerned about the mass-adoption of algorithmic pricing software in markets.

AI software can be rewritten to avoid antitrust pricing violations

Francisco Beneke and Mark-Oliver Mackenrodt 2020 (both are with , Max Planck Institute for Innovation and Competition, Munich, Germany) 5 Aug 2020 Remedies for algorithmic tacit collusion JOURNAL OF ANTITRUST ENFORCEMENT <https://academic.oup.com/antitrust/article/9/1/152/5880803> (accessed 20 Aug 2021)

If certain predictions and rules for establishing a price by an algorithm can lead to social harm, a reasonable approach would be to code the software in such a way that certain variables are left out of the model. A common example cited outside of the antitrust arena is that of discrimination based on personal characteristics such as ethnicity. In this case, the problem could be avoided if the algorithm is not fed with data on this variable. The problem is, as pointed out by Harrington, that the algorithm could still zero in on a consumer’s ethnicity by association with other variables such as geographical location. In the same way, the interaction of algorithms could lead to stable interdependent pricing by inferring likely reactions of rivals from indirect data such as changes in the firm’s demand.

Federal Trade Commission (FTC) is qualified and competent to enforce prohibition of collusive pricing algorithms

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 17 Aug 2021)

The FTC may then have a legal mandate and, in terms of expertise, the FTC could well be the agency most qualified to identify and prosecute collusion in online markets by AAs. In pursuing consumer protection, the FTC has had many cases involving online practices regarding privacy and data security. As noted in its 2016 Privacy & Data Security Update, the FTC has brought enforcement actions relating to "spam, social networking, behavioral advertising, pretexting, spyware, peer-to-peer file sharing, and mobile." Given this developed expertise for online markets and automated processes, the FTC is in a good position to build on that base of knowledge so as to define and enforce a prohibition of collusive pricing algorithms.

Details on how enforcement of the Sherman Act works: FTC (Federal Trade Commission) and Dept of Justice (DOJ)

Alden Abbott 2021 (Senior Research Fellow, Mercatus Center, George Mason Univ.) 24 Mar 2021 “US Antitrust Laws: A Primer” <https://www.mercatus.org/publications/antitrust-policy/us-antitrust-laws-primer> (accessed 20 Aug 2021)

How does dual antitrust enforcement by the FTC and the DOJ Antitrust Division work? In some respects, the two agencies’ authorities overlap, but in practice the two agencies complement each other. Over the years, the agencies have developed expertise in particular industries or markets. For example, the FTC devotes most of its resources to segments of the economy where consumer spending is high: healthcare, pharmaceuticals, professional services, food, energy, and certain high-tech industries such as computer technology and internet services. Before opening an investigation, the agencies consult with one another to avoid duplicating efforts. In this policy brief, “agency” refers to either the FTC or the DOJ, whichever is conducting the antitrust investigation. Premerger notification filings, information obtained from consumers or businesses, congressional inquiries, or articles on consumer or economic subjects may trigger an agency investigation. Generally, these investigations are not open to the public, to protect both the investigation and the individuals and companies involved. If the agency believes that a person or company has violated the law or that a proposed merger may violate the law, the agency may attempt to obtain voluntary compliance by entering into a consent order with the company. A company that signs a consent order need not admit that it violated the law, but it must agree to stop the disputed practices outlined in an accompanying complaint or take certain steps to resolve the anticompetitive aspects of its proposed merger. If a consent agreement cannot be reached, the options available going forward depend on which agency is conducting the investigation. For the DOJ there is only one option: sue in federal court to seek an injunction to stop the harmful conduct or (in the case of hard-core per se illegal activity) to obtain a criminal conviction. Today, under the terms of a leniency program for informants (parties who privately inform the DOJ of their involvement in an antitrust crime), the DOJ is notified of many hard-core cartel offenses, such as price fixing or bid rigging. In such instances, cartel members, rather than face trial, often agree to criminal penalties through a court-administered settlement with the DOJ. The FTC, unlike the DOJ, has two options: it may pursue injunctive relief in the federal courts, but it may also file an administrative complaint. An FTC administrative complaint initiates a formal proceeding that is much like a federal court trial but that takes place before an administrative law judge. Evidence is submitted, testimony is heard, and witnesses are examined and cross-examined. If a law violation is found, a cease-and-desist order may be issued. An initial decision by an administrative law judge may be appealed to the FTC. Final decisions issued by the FTC may be appealed to the US Court of Appeals and, ultimately, to the Supreme Court. If the FTC’s position is upheld, then the FTC, in certain circumstances, may seek consumer redress in court. If a company violates an FTC order, the FTC may also seek civil penalties or an injunction.

A/T “Corporations outsource their AI software” – Holding the corporation responsible is still the right solution because they will pass the risk to the software designers

Prof. Mihailis E. Diamantis 2020 (Assoc. Professor, Univ of Iowa College of Law) The Extended Corporate Mind: When Corporations Use AI to Break the Law, NORTH CAROLINA LAW REVIEW 1 May 2020 , The Extended Corporate Mind: When Corporations Use AI to Break the Law https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=6786&context=nclr (accessed 16 Aug 2021)

One might worry that the same reasoning will not work if, as is often the case, a corporation hires a more experienced technology firm to design its algorithms. In that case, the most direct way to prevent crime might be to target the incentives of the technology firm. However, holding corporate end users liable can accomplish the same result. Corporations will undoubtedly pass the costs of algorithmic misconduct onto technology firms through indemnification agreements, thereby forcing the technology firms to internalize the risk of misconduct. If they bear the financial risk when their algorithms misbehave, technology firms will take more efficient precautions in designing and testing their products. It is administratively easier to hold corporate end users liable rather than going to the technology firms directly. That removes the courts from the messy business of apportioning liability between technology firms (for design error) and corporate end users (for user error).

Standards for determining whether AI pricing is fair or collusive

Prof. Joseph Harrington 2018. (Professor, Dept of Business Economics & Public Policy The Wharton School, Univ. of Penn.) Developing Competition Law for Collusion by Autonomous Artificial Agents 13 Nov 2018 Journal of Competition Law and Economics <https://joeharrington5201922.github.io/pdf/Collusion%20and%20Autonomous%20Pricing_18.11.13.pdf> (accessed 17 Aug 2021) (brackets added)

Preventing collusion means constraining an AA [autonomous artificial agents] so it does not condition its actions on how rival firms’ AAs will respond to those actions in a manner that supports supracompetitive prices. An AA is "fair" if its recommendation is not dependent on, say, a person’s gender. An AA is "not collusive" if its price recommendation is not dependent on rival firms’ responding in a particular manner; for example, a price increase is not contingent on rival firms subsequently matching that price, or maintaining price is not contingent on rival firms conducting a price war if price were to be reduced.

There are ways to detect tacit (non-communicated) collusion in the market

Francisco Beneke and Mark-Oliver Mackenrodt 2020 (both are with , Max Planck Institute for Innovation and Competition, Munich, Germany) 5 Aug 2020 Remedies for algorithmic tacit collusion JOURNAL OF ANTITRUST ENFORCEMENT <https://academic.oup.com/antitrust/article/9/1/152/5880803> (accessed 20 Aug 2021)

There are ways in which instances of tacit collusion can be distinguished from parallel pricing, which is important given that the latter is perfectly consistent with competitive behaviour. For example, interdependent pricing should be less responsive to cost and demand changes in order to avoid conduct that could destabilize the oligopoly price. A price decrease in response to lower costs could be interpreted by the rest of the market participants as cheating. If firms are pricing competitively, as is the case during price wars, lower costs should be reflected with greater frequency in price decreases.